

An account is given (pp. 66–88) of the mitoses of the arche-sporium and embryo-sac, based mainly on a study of *Asperula montana*, *Crucianella macrostachya* and *C. gilanica*. The embryo-sac mother-cell contains a large number of coarse fibers which persist through the prophase of the first division and are regarded as currents of kinoplasm and not, therefore, as a rearrangement of the reticulum. As in the higher plants, the spindle is of multipolar origin, no centrosomes are present, and the maturation divisions are normal. In *Crucianella* the interesting discovery of ten as the reduced number of chromosomes was made.

The behavior of the pollen tube in *Diodia* and *Richardsonia* is given in much detail. After leaving the pistil the tube may make its way either between and in a direction at right angles to the columnar epidermal cells that are in the neighborhood of the micropyle (*Richardsonia pilosa* and *Diodia teres*), or, it may extend to the surface of the ovule and travel upon it to the micropyle (*Diodia Virginiana*). Professor Lloyd concludes that chemotropism is the important factor in determining the later direction of growth of the pollen tube, that the distribution of the irritant is a differential one, and, finally, he suggests that the synergidae or possibly the ovum may be the source of the stimulant. The pollen tube does not as a rule act unfavorably on the cells with which it comes into contact except in so far as injury may arise from the pressure that it may exert upon them.—W. A. CANNON.

**A University Text-book of Botany\***

With nearly 400 pages devoted to the botanical system out of a total of 550, the present work would seem to represent a work on systematic botany and it must be interpreted mainly from that standpoint, although it is written by one who has never been classed as a systematic botanist. The work as a text-book must most naturally be compared or contrasted with the most recent emanation from the Germans familiarly known in our laboratories as the "Bonn text-book," for it is evidently this work that the

\* A University Text-Book of Botany, by Douglas Houghton Campbell, Ph.D. xv + 579 pp. Pl. 1–15 + f. 1–193. New York, Macmillan & Co. (Price, \$4.00.)

present volume aspires to replace. The relative space given in the two works to the various major divisions of the subject can be seen by a direct comparison :

	Campbell.	Bonn Text.
Introduction and General Morphology,	65	130
Physiology,	34	124
Botanical System,	395	271
Ecology,	35	
Distribution in time and space,	21	
Total pages,	550	525

Of necessity much of the work is a compilation from many sources but it seems strange that in following the systematic arrangement of Engler and Prantl there has not been more of an attempt to bring that work, which is already comparatively old in parts, at least up to the standard suggested by its own authors, even if the additions made by other workers were not considered. It is inexcusable, for instance, that the complex Helvellaceae should continue to stand next above the simple Exoascaceae, a blunder so patent that the incongruity was pointed out in the German text itself before its completion. Class and ordinal terminology follows a hap-hazard arrangement wholly at variance with the principles enunciated at Berlin itself, and generally accepted wherever the importance of a consistent terminology is recognized. Thus the author accepts Howe's class Anthocerotes as a coördinate group with the Hepaticae, but the name is changed to *class* Anthocerotales, thus improperly using a termination reserved for a group of ordinal rank alone.

The bibliographies at the close of the chapters are curious in their detail, and one is at a loss to know the *motif* in the selection of titles. On the one hand papers of comparative unimportance are freely cited, and on the other standard works are wholly omitted. It is hard to understand why a page should be wasted in a *university* text-book in citing the long list of recent elementary texts in botany both English and American, while among the 365 bibliographic citations from American botany no reference whatever is made to such classics as Torrey and Gray's Flora of North America or Harvey's Nereis. A bibliography of American lichens that omits all reference to the works of Edward Tucker-

man and yet cites Schneider's Guide is, to say the least, strangely askew in botanical perspective. More than once the same work is cited in different places under different titles and throughout there is lack of attention to minor details that distinguish a really valuable bibliography from a random selection of unsorted titles of papers. Accuracy in bibliographic citation is one of the characteristics of recent American botany, but in this work there is a relapse toward English inaccuracy which is far below the American standard.

No less curious are the titles of chapters where logical arrangement would be naturally expected in a systematic work, and where the student needs to have all the mechanical aids that are possible to a clear coördination of the subject. Chapter IV., for instance, is entitled "Classification" and that word occupies the headline of the right-hand page throughout the chapter, but only a page and a quarter of the chapter is devoted to the subject of "classification," where that word also appears as a subtitle or one of the subdivisions of itself, while the bulk of the chapter is devoted to the lowest groups of plants, mainly the schizophytes and the diatoms. Although the author includes both the bryophytes and the pteridophytes under the "Archegoniatae," Chapter VII. alone is headed "Archegoniatae" and treats only of bryophytes, while Chapters VIII. and IX. are headed "Pteridophyta" with no suggestion in the headlines of their relation to any other coördinate division. In a similar way the subtitles are a strange mixture of illogical sequence and lack of proper subordination. For example, in the chapter on the "Angiospermae," three fifths of which is not devoted to that subject but to one of its two divisions, the following subtitles appear in coördinated typography: "The Flower," "The Ovule," "The Antipodal Cells," "Pollination," "The Homologies of the Embryo-sac," "Germination," "The Leaf," "The Floral Leaves," "Structure of the Flower," "Classification of the Angiosperms."

The illustrations are not up to the standard of first-class American laboratories, many of them being sketchy and showing an unfinished appearance. In this field a student should have models set before him in the way of botanical illustration, at least of as

high a grade as would be required in a master's thesis. Some of the illustrations that are apparently redrawn from this and that author are frequently a good way "after" the originals.

The space devoted to certain important subjects like embryology is too meager, at least on its physiological side, and the whole chapter on physiology, besides being out of all proportion to the size of the work in its brevity, in some places becomes a mere catalogue of important topics with striking bold-face headlines and a few words of explanatory matter.

While the work has many good features that will readily commend themselves, it can by no means be taken to represent the standard of American botany of the present day. The subject of botany has become too broad to lie within the grasp of one man, and the ideal university text-book—still a dream of the future—must be the work of many specialists with the whole brought into coördination by one master mind whose botanical perspective is so clear-cut that the real relation of parts will form a consistent and logical whole. Even the phlegmatic Germans have reached this point and have set an example of this sort. It remains for Americans in the future to adopt and perfect the plan.

LUCIEN M. UNDERWOOD.

## PROCEEDINGS OF THE CLUB

TUESDAY, MAY 13, 1902

The meeting of May 13 was held at 8 p. m., at the College of Pharmacy ; 18 persons present ; Dr. H. H. Rusby in the chair.

The secretary reported a request from the Brooklyn Institute to print the Torrey Club's weekly program of excursions on the weekly program-ticket of the Institute. The Club voted its endorsement of this arrangement.

The treasurer asked for the appointment of a committee to report on the price of the Memoirs to members of the Club. As a committee the chair appointed the board of editors and the treasurer.

Dr. Underwood and others discussed the proposed Fourth of July excursion to the lakes near Jamesville, N. Y. With this it